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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/039,309	11/07/2001	Eiji Sato	45672/56,682	2127
21874	7590	04/01/2005	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			MONDT, JOHANNES P	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/039,309	Applicant(s) SATO ET AL.	
	Examiner Johannes P. Mondt	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/3/05, 3/18/05.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4 and 6-9 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/3/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

After-Final Amendment filed 3/18/2004 has been entered and, in conjunction with the Information Disclosure Statement filed 3/3/2005, said After-Final Amendment has prompted to withdraw the finality of the previous office action mailed 1/21/2005 at this time for the reasons explained in "response to Arguments" below.

Information Disclosure Statement

The examiner has considered the items listed in the Information Disclosure Statement filed 3/3/05. A signed copy of substitute Form PTO-1449 is herewith enclosed.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 4, 8 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al (JP 10-333121) (IDS item BC), in view of "Liquid Crystal Device Handbook", 142nd Committee of Japan Society for the Promotion of Science, pp. 353-355, October 1990, (as submitted as IDS item CA). Miyazaki et al teach a liquid crystal display device (title) comprising:

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a liquid crystal layer 12; a pair of substrates 1 and 7 provided so as to interpose the liquid crystal layer therebetween; and a plurality of pixels (pixels in areas 11) arranged in a matrix pattern (Figure B), wherein: the liquid crystal layer has a helical structure (molecular structure, i.e.) and exhibits at least two stable states including a planar state (inherently the initial state before applying any electric field is stable and exists) and a focal conic state (inherently, for sufficiently high voltage a focal conic state is reached, said focal conic state being defined as a polydomain state with a substantial random orientation of the helical axis of the liquid crystal molecules) according to an applied voltage; and in each of the plurality of pixels, a thickness d of the liquid crystal layer has at least two values (see Figure A, and paragraphs [0015] and [0016]), and, consequently, the liquid crystal layer has at least two regions having different values of a first threshold voltage for transitioning the liquid crystal layer from the planar state to the focal conic state (this is inherent in the variable thickness because the transition is due to the existence of a local critical electric field while electric field is directly proportional to the ratio of voltage divided by distance), and wherein the thickness d of the liquid crystal layer is defined so that the first threshold voltage (" V_{thmax} ") for transitioning from the planar state to the focal conic state in the area with the largest thickness d (said threshold voltage is called " V_{th1} " in Miyazaki et al; see Figure 16 and discussion of Prior Art in Miyazaki et al) is less than a second threshold voltage (" V_{thmin} ") for transitioning from the focal conic state to the homeotropic state in a region with a smallest thickness d of the liquid crystal layer (called " V_{th2} " in Miyazaki et al, loc.cit.). Also please note that the threshold voltage for any transition depends linearly

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on the thickness of the liquid crystal layer because a transition is achieved for a critical electric field, not for a voltage per se, while inherently the voltage across the liquid crystal layer is proportional to the thickness of said liquid crystal layer. Therefore, the differences in the thickness of said crystal layer by Miyazaki et al, which are merely of the order of a percent or so (see paragraphs [0015]-[0016]), cannot possibly cause a crossover between the first threshold voltage and the second threshold voltage as the first and second threshold voltage have a ratio that is only dependent upon the material, in this case chiral nematic crystal (see par. [0009]), and are more than a factor two apart.

Miyazaki et al do not necessarily teach the further limitation that the thickness d of the liquid crystal layer satisfies $1 < d/P < 15$ with a helical pitch P of the helical structure. *However, it would have been obvious* to include said further limitation in view of "Liquid Crystal Device Handbook", 142nd Committee of Japan Society for the Promotion of Science, in which a liquid crystal layer with molecules of helical structure (see (1) on page 353) and three stable states (planar, focal conic and homeotropic) (hence quite analogous art) in which a ratio of d/P greater or equal to 2, and in particular 7.5, is taught (loc.cit.). It would have been obvious to include the teaching by said 142nd Committee in the invention by Miyazaki et al because (a) evidently the range is known in the art of bistable liquid chiral nematic crystal liquid displays, while Applicant is reminded that it has been held that a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art or when the ranges of a claimed composition do not overlap but are close enough such

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that one skilled in the art would have expected them to have the same properties. See *In re Peterson*, 65 USPQ2d 1379 (CA FC 2003); while a liquid crystal layer that is thick in units of an elementary molecular property of the material out of which it is constituted inherently suppresses thermal fluctuations.

On claim 4: a value of the thickness d of the liquid crystal layer by Miyazaki et al increases from the center of the liquid crystal display device to each end of the liquid crystal display device (see Figures 7, 8, 9 and 11), and said increase in thickness is effected by a succession of a plurality of substantially flat or substantially horizontal regions (said plurality of substantially flat regions is indicated by encircled numerals 1 and 2 in Figure 7, for instance) in a pixel electrode that provides a staircase pattern that rises from each of said ends to said center of the liquid crystal display device.

On claim 8: the upper surface of the lowest of the two substrates in Figure 7, hence the one closer to the liquid crystal layer than the other side of said substrate by Miyazaki et al is concave as a whole.

On claim 9: the top surface of the bottom substrate in Figures 7, 8, 9 and 11 by Miyazaki et al is concave, while the bottom surface of the top substrate in Figures 7, 8, 9 and 11 is both concave and convex according to the second definition of convex cited from Merriam-Webster (see rejection under 35 U.S.C. 112 of claim 8 given above).

3. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al and the 142nd Committee as applied to claim 1 above, and further in view of Scherer et al (5,880,801). The liquid crystal display device by Miyazaki et al further comprises a pair of alignment layers 4 and 10 (see English abstract and front figure)

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provided respectively on the pair of substrates on one side thereof that is closer to the liquid crystal layer 12. Neither Miyazaki et al nor the 142nd Committee necessarily teach the further limitation that one alignment layer is a horizontal alignment layer and another is a vertical alignment layer. *However, it would have been obvious* to include said further limitation in view of Scherer et al, who teach top and bottom substrates 42 and 44, respectively (cf. col. 4, l. 20-60) to be aligned horizontally and vertically, respectively, so as to achieve hybrid-aligned cells by which an electro-optic response is achieved at low voltage compared with a device with pure homogeneous alignment (cf. col. 3, l. 29-47).

Motivation to include the teaching by Scherer into the invention by Miyazaki et al and the 142nd Committee in this regard stems from the desirability to achieve response at low voltage (Scherer, loc.cit). Combination of said teaching and said invention is straightforward through the process to make HAN crystal cells as disclosed by Scherer et al (cf. col. 3, l. 7-47). Success in implementing said combination can therefore be reasonably expected.

4. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al and the 142nd Committee as applied to claim 1 above, and further in view of Okada et al (JP406102485A). As detailed above, claim 1 is unpatentable over Miyazaki et al in view of the 142nd Committee. Neither necessarily teaches the further limitation as defined by claim 6. However, it would have been obvious to include said further limitation in view of Okada et al, who, teach that the value of the thickness changes continuously across the pixels (cf. Figure 8a). It would have been particularly obvious to

include the teaching by Okada et al in this regard because sharp corners cause high electric field values quite unlike the electric field value desired because of the tailoring of the thickness of the liquid crystal layer, thus creating small but unwanted areas in which the threshold value of the electric field at which a transition occurs in the state of said liquid crystal.

Allowable Subject Matter

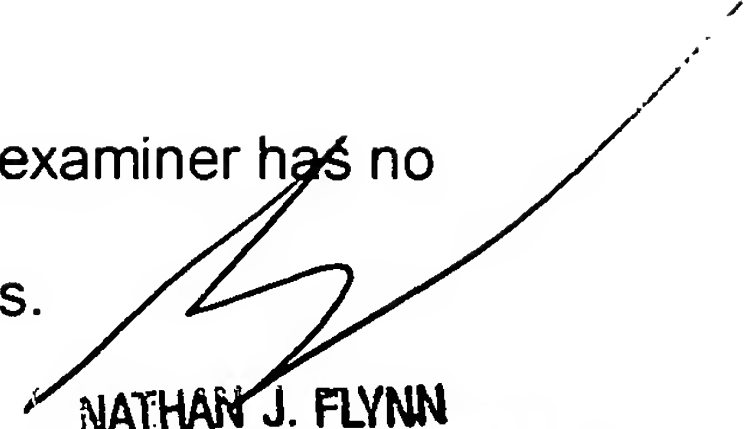
5. ***Claim 5*** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: the further limitation defined by claim 5 has not been found within the context of an invention teaching claim 1: the differences in thickness taught by Miyazaki et al are of the order of a percent or so, relative to the thickness itself, while differences of magnitude implied by $0.5 P \leq \Delta d$ do not necessarily preserve the strict ordering of V_{thmax} and V_{thmin} as claimed.

Response to Arguments

The Information Disclosure Statement filed 3/3/05 has revealed important and pertinent prior art for claims 1, 4 and 6-9 as shown in the rejections made above. In particular, Miyazaki et al, IDS item BC do teach all limitations of claim 1 except for the range limitation on the ratio of layer thickness d divided by helical pitch P . Furthermore, and most importantly, the partial translation into English of the Japanese "Liquid Crystal Device Handbook", IDS item BA, reveals the range as claimed to significantly overlap a range that is entirely common for the same type of liquid crystal display device, namely

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a chiral nematic liquid crystal device. Therefore, with regret, the examiner has no alternative but to reject claim 1 and most of the dependent claims.


NATHAN J. FLYNN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM
March 30, 2005

Patent Examiner:


Johannes Mondt (Art Unit: 2826).